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EXAMINER	
LEE, SIU M	

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/674,730	WALTHO ET AL.	
	Examiner	Art Unit	
	Siu M. Lee	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 May 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 May 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 5/14/2007 have been fully considered but they are not persuasive.

(1) Applicant's argument on page 8-9 regarding the 35 U.S.C. §102(b) rejections of claims 1-4, 6-7, and the 35 U.S.C. §103(a) rejections of claims 5, 8 and 9-12:

Applicant's argument:

Applicant cannot find in Seocho-Ku a disclosure of a method that includes applying a time delay to a signal using an adjustable time delay line to place the signal in an anti-phase with an interference signal to provide substantially broadband cancellation of the interference signal.

Examiner's response:

The limitation of "through an adjustable time delay line to apply a time delay placing the signal in an anti-phase with the interference signal" is added to claims 1 and 9 in the amendment dated 5/14/2007. The original claim 1 and 9 do not contain this limitation. Therefore, the applicant's argument with respect to claims 1-12 have been considered but are moot in view of new ground(s) of rejection because of the amendment.

(2) Applicant's argument on page 10 regarding the 35 U.S.C. §103(a) rejections of claims 13-30:

Applicant's argument:

The cited references fail to disclose an adjustable delay line to place the correction signal in an anti-phase with an interference signal on an interference path from the first signal path to the second signal path.

Examiner's response:

The limitation of "to place the correction signal in an anti-phase with an interference signal on an interference path from the first signal path to the second signal path" is being added in the amendment dated 5/14/2007. The original independent claims 13 and 24 do not mention phase change, therefore, the applicant's argument with respect to claims 13-30 have been considered but are moot in view of new ground(s) of rejection because of the amendment.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-7, 13, 17-19, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seocho-Ku (EP 0 905 914 A2) in view of Rehm (US 5,939,912).

(1) Regarding claim 1:

Seocho-Ku discloses a method comprising directing a signal sampled from an interference signal through a delay line to apply a time delay and a variable phase shifter to placing the signal in an anti-phase with the interference signal to provide

substantially broadband cancellation of the interference signal (interference canceller I figure 5, page 4, lines 32-47).

Seocho-Ku fails to disclose an adjustable time delay to apply a time delay placing the signal in an anti-phase with the interference signal.

However, Rehm discloses a variable delay line (variable delay line 142 in figure 2) that can place the signal in an anti-phase with the interference signal (delay line 142 is controlled by the feedback signal and is set to provide a delay such that the output signal from the delay line is 180 degrees out of phase with the input signal, column 7, lines 59-64).

It is desirable to have a variable delay line to apply a time delay placing the signal in an anti-phase with the interference signal because it allow for infinite phase adjustability (column 2, lines 21-23). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the delay line and variable phase shifter of Seocho-Ku with the variable delay line of Rehm to increase the flexibility of the system.

(2) Regarding claim 2:

Seocho-Ku discloses a method wherein providing substantially broadband cancellation includes substantially matching an amplitude of the sampled signal with an amplitude of the interference signal (page 4, lines 38-40).

(3) Regarding claim 3:

Seocho-Ku discloses a method wherein providing substantially broadband cancellation includes substantially matching an amplitude of the sampled signal with an

amplitude of the interference signal to within about a 0.1 db accuracy (the interference canceller 27 attenuates the provided signal from the power divider 25 until the provided signal has the amplitude as same as that of the signal transmitted from the transmitting antenna 21 to the receiving antenna 22, page 4, lines 38-40, lines 54-55).

(4) Regarding claim 4:

Seocho-Ku discloses a method wherein the method further includes providing about a 180 degree phase shift to the signal sampled from the interference signal (variable phase shifter 30 in figure 5 provides a 180 phase shift of the attenuated signal, page 4, line 55).

(5) Regarding claim 5:

Seocho-Ku discloses wherein providing about a 180.degree phase shift to the signal sampled from the interference signal (a variable phase shifter 30 in figure 5 to provide a 180 degree of the attenuated signal, page 4, lines 55)

Seocho-Ku does not explicitly disclose the phase shift includes providing about a 90.degree phase shift upon sampling and providing about a 90 degree phase shift coupling the sampled signal to a signal path receiving the interference signal.

However, it is functional equivalence between a 180 degree phase shift and two 90 degree phase shift so as to obtain an inverse of the interference signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Seocho-Ku reference to include the claimed "a 90 degree phase shift upon sampling and providing about a 90 degree phase shift coupling the sampled signal to a signal path receiving the interference signal" feature in Seocho-Ku's

teaching, in order to obtain an inverted interference signal for canceling out the signal path receiving the interference signal.

(6) Regarding claim 6:

Seocho-Ku discloses a method wherein the method further includes generating the interference signal as a signal from a transmitter through its associated antenna with the substantially broadband cancellation of the interference signal applied to the interference signal received by a second antenna associated with a receiver (canceller 27 receives the signal from the power divider 25 and delays the transmitted signal by wave travel time, the attenuator 29 attenuated the delayed transmitted signal until it equals to the interference signal and a variable phase shifter 30 180 degree phase shift the delayed and attenuated transmitted signal for canceling of the interference signal from the transmitter 23 in figure 4, page 4, lines 28-55).

(7) Regarding claim 7:

Seocho-Ku discloses a method wherein the method further includes monitoring a signal strength received from a signal path receiving the sampled signal and the interference signal (the attenuator 29 may attenuate the received signal so as to become A'=A" as described in equation 5 in page 5, lines 50-55, page 4, line 54) and adjusting the time delay to minimize the signal strength received from the signal path (the delay 28 in figure 5 delays the transmitted signal by wave travel time, which is the time of travel from the transmitting antenna 21 to the receiving antenna 22, page 4, lines 28-30).

(8) Regarding claim 13:

Seocho-Yu discloses an apparatus comprising:

a first signal path (the path of the transmitter 23 to the antenna 21 in figure 4);

a second signal path (the path of the antenna 22 to the receiver 24 in figure 4);

a delay line (delay line 28 in figure 4) and a variable phase shifter (variable phase shifter 30 in figure 4) to provide a time delay to a correction signal propagating from the first signal path to the second signal path (the delay 28 delays the signal received from the power divider 25 by the signal travel time, the signal travel time refers to the time of travel from the transmitting antenna 21 to the receiving antenna 22, page 4, lines 36-38, line 51) to place the correction signal in an anti-phase with an interference signal on an interference path from the first signal path to the second signal path; and

a variable attenuator (variable attenuator 29 in the interference canceller in figure 5) coupled to the adjustable a delay line (delay line 28 in figure 4) and a variable phase shifter (variable phase shifter 30 in figure 4) to amplitude match the correction signal to the interference signal to provide substantial broadband cancellation of the interference signal (the attenuator 29 attenuates the delayed signal to the signal of which amplitude is the same as that of the signal radiated through the transmitting antenna 21, the interference canceller 27 attenuates the provided signal from the power divider 25 until the provided signal has the amplitude as same as that of the signal transmitted from the transmitting antenna 21 to the receiving antenna 22, page 4, paragraph 0028, lines 3-5 and paragraph 0030, lines 1-2).

Seocho-Ku fails to disclose an adjustable delay line to provide a time delay to a correction signal propagating from the first signal path to the second signal path to place

the correction signal in an anti-phase with an interference signal on an interference path from the first signal path to the second signal path.

However, Rehm discloses a variable delay line (variable delay line 142 in figure 2) that can provide a time delay to a correction signal propagating from the first signal path to the second signal path to place the correction signal in an anti-phase with an interference signal on an interference path from the first signal path to the second signal path (delay line 142 is controlled by the feedback signal and is set to provide a delay such that the output signal from the delay line is 180 degrees out of phase with the input signal, column 7, lines 59-64).

It is desirable to have a variable delay line to apply a time delay placing the signal in an anti-phase with the interference signal because it allow for infinite phase adjustability (column 2, lines 21-23). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the delay line of Seocho-Ku with the variable delay line of Rehm to increase the flexibility of the system.

(9) Regarding claim 17:

Seocho-Yu's apparatus further including a first tap to couple the correction signal to a primary path from the first signal path to the adjustable delay (the power divider 25 in figure 4, the power divider 25 divides the signal T(t) to be transmitted and provides the interference canceller 27 with the divided signal, page 4, lines 34-35).

(10) Regarding claim 18:

Seocho-Ku's apparatus further including a second tap to couple the primary path to the second signal path (the power coupler 26 in figure 4, the power coupler 26

combines the signal T(t) from the interference canceller 27 and the signal received by the receiving antenna 22, page 4, lines 42-43).

(11) Regarding claim 19:

Seocho-Ku's apparatus further including a phase corrector coupled to the adjustable delay line (variable phase shifter 30 is couple to the delay 28 in figure 5, page 4, lines 48-50), the phase corrector to provide a small phase adjustment to the anti-phase generated by the adjustable delay line.

(12) Regarding claim 21:

Seocho-Ku's apparatus further discloses wherein the first signal path includes a transmitter and a first antenna (transmitter 23 and antenna 21 in figure 4), and the second signal path includes a receiver and a second antenna (receiver 24 and antenna 22 in figure 4, page 4, lines 32-33).

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seocho-Ku (EP 0 905 914 A2) in view of Behm (US 5,939,912) as applied to claim 1 above, and further in view of Sugar et al. (US 2002/0080728 A1).

Seocho-Ku discloses a method wherein providing substantially broadband cancellation includes providing substantially broadband cancellation to an interference signal, where the interference signal propagates from a transmitting antenna of a device to a receiving antenna of the device.

Seocho-Ku and Behm fail to disclose the transmitting antenna using a first wireless protocol and the receiving antenna using a second wireless protocol.

However, Sugar et al. discloses a transmitting antenna using a first wireless protocol and a receiving antenna using a second wireless protocol (figure 2 is a block diagram of the wideband transceiver system architecture that has a transmitting antenna and a receiving antenna and the wideband architecture is used to process multiple WLAN protocols such as Bluetooth, Home RF and IEEE 802.11 in the 2.4 GHz ISM band, paragraph 0018, lines 1-7).

It is desirable to have a transmitting antenna using a first wireless protocol and a receiving antenna using a second wireless protocol because it benefit from IC cost reduction associated with reductions in digital CMOS IC geometry (paragraph 0007). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Sugar et al. with the method of Seocho-Ku and Behm to make the method more cost efficient.

5. Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seocho-Ku (EP 0 905 914 A2) in view of Behm (US 5,939,912) and Rose, Jr. (US 5,127,101).

(1) Regarding claim 9:

Seocho-Ku discloses a method comprising:

directing a correction signal to propagate from a first signal path (T(t) in figure 4) through a delay line (delay line 28 in figure 5) and a variable phase shifter (variable phase shifter 30 in figure 5) to a second signal path (R(t) in figure 4) to provide a correction signal (T'(t) in figure 4) in an anti-phase with an interference signal

(paragraph 0028, page 4, lines 36-47), the interference signal propagate over an interference path (Tr(t) in figure 4) between the first signal path and the second signal path, the interference path separate from a primary path of the correction signal (the path through the interference canceller 27 in figure 4) (page 4, lines 32-47);

adjusting an amplitude of the correction signal (the variable attenuator 29 adjust the amplitude of the correction signal, page 4, lines 51-53); and

Seocho-Ku fails to disclose (a) using an adjustable time delay line to provide a time delay placing the correction signal in an anti-phase with an interference signal; (b) periodically resetting the time delay and adjusting the amplitude of the correction signal.

With respect to (a), Rehm discloses a variable delay line (variable delay line 142 in figure 2) that can place the signal in an anti-phase with the interference signal (delay line 142 is controlled by the feedback signal and is set to provide a delay such that the output signal from the delay line is 180 degrees out of phase with the input signal, column 7, lines 59-64).

It is desirable to have a variable delay line to apply a time delay placing the signal in an anti-phase with the interference signal because it allow for infinite phase adjustability (column 2, lines 21-23). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the delay line and variable phase shifter of Seocho-Ku with the variable delay line of Rehm to increase the flexibility of the system.

With respect to (b), Rose, Jr. discloses a method that periodically resetting the time delay and adjusting the amplitude of the correction signal (column 10, line 60 to column 11, line 2).

It is desirable to periodically resetting the time delay and adjusting the amplitude of the correction signal because it can maintain the amplitude and time delay obtained in the initial alignment (column 5, lines 1-3). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Rose, Jr. in the method of Seocho-Ku and Behm to improve the accuracy of the interference cancellation method.

(2) Regarding claim 10:

Seocho-Ku discloses the method further includes sampling the interference signal to generate the correction signal (power divider 25 in figure 4 sampled the interference signal from the transmitting path to generate the correction signal, page 4, lines 34-35).

(3) Regarding claim 11:

Rose, Jr. further discloses wherein periodically resetting the time delay and adjusting the amplitude occurs during a time interval in which no communication signals are being externally transmitted or received along the first signal path or the second signal path (although auto alignment sequence for each site is implemented on a periodic basis, the alignment mode is activated only when no system activity is sensed, column 5, lines 12-14).

(4) Regarding claim 12:

Rose, Jr. further disclose wherein the method further includes:

transmitting a test signal along the first signal path (transmit a test signal from the control center to a selected site transmitter, column 10, lines 60-61); receiving a response signal associated with the test signal from the second signal path (the retransmission of the test signal from the selected site transmitter to the control center, column 10, lines 62-63), the response signal having a signal strength the difference between the retransmitted signal and a reference signal); and

adjusting the time delay and adjusting the amplitude to minimize the signal strength (column 10, line 67-column 11, line 2).

It is desirable to transmitting a test signal along the first signal path; receiving a response signal associated with the test signal from the second signal path, the response signal having a signal strength; and adjusting the time delay and adjusting the amplitude to minimize the signal strength because it compensate for time and amplitude variation in the system (column 1, lines 45-56). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Rose Jr. in the method of Seocho-Ku and Behm to improve the reliability of the method.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seocho-Ku (EP 0 905 914 A2) in view of Behm (US 5,939,912) as applied to claim 13 above, and further in view of Loo et al. (US 5,757,319).

Seocho-Ku in view of Behm discloses all the subject matter as discuss above except wherein the adjustable delay line includes one or more microelectromechanical switches.

However, Loo et al. discloses an adjustable delay line includes one or more microelectromechanical switches (figure 2, column2, lines 49-53 and column 4, lines 56-64).

It is desirable to have the adjustable delay line includes one or more microelectromechanical switches because the microelectromechanical switches have low loss over a wide frequency range (column 3, lines 60-61). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the variable delay line of Seocho-Ku and Behm by the adjustable delay line includes one or more microelectromechanical switches as taught by Loo et al. to improve the performance of the apparatus.

7. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seocho-Ku (EP 0 905 914 A2) in view of Behm (US 5,939,912) as applied to claim 13 above, and further in view of Sengupta et al. (US 6,556,102 B1).

(1) Regarding claim 15:

Seocho-Ku in view of Behm disclose all the subject matter as discuss above except wherein the adjustable delay line includes a material whose permittivity can be changed to adjust the speed of propagation of the correction signal.

However, Sengupta et al. discloses an adjustable delay line includes a material whose permittivity can be changed to adjust the speed of propagation of the correction signal (figure 5 shows a coplanar tunable dielectric delay line 92, the delay line takes advantage of low loss voltage tunable materials to build tunable delay lines that vary the dielectric constant by a change of the voltage across the material, the delay line is made of multiple layers of tunable material, column 6, lines 40-42 and 58-62).

It is desirable to have the adjustable delay line includes a material whose permittivity can be changed to adjust the speed of propagation of the correction signal because the accurate time delay will be easier to obtain by tuning a DC voltage (column 7, lines 31-32). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the variable delay line of Seocho-Ku and Behm by the tunable delay line of Sengupta et al. to improve the accuracy of the delay line.

(2) Regarding claim 16:

Sengupta et al. further discloses wherein the material is barium strontium titanate (column 8, lines 26-28).

8. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seocho-Ku (EP 0 905 914 A2) in view of Behm (US 5,939,912) as applied to claim 19 above, and further in view of Cronyn (US 4,991,165).

Seocho-Ku in view of Behm fails to disclose a controller to manage the variable attenuator, the adjustable delay line, and the phase corrector.

However, Cronyn discloses digital adaptive interference canceller with a controller to manage the variable attenuator, the adjustable delay line, and the phase corrector (the computer 42 in figure 2 adjust the delay, phase and the amplitude of the signal of the interference canceller to minimize the residual signal, column 8, lines 7-11).

It is desirable to have a controller to manage the variable attenuator, the adjustable delay line, and the phase corrector because it is easier to implement and flexible (column 2, lines 49-68). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Cronyn in the apparatus of Seocho-Yu and Behm to increase the flexibility of the apparatus.

9. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seocho-Ku (EP 0 905 914 A2) in view of Behm (US 5,939,912) as applied to claim 21 above, and further in view of Stolarczke et al. (US 5,093,929).

Seocho-Ku in view of Behm disclose all the subject matter as discuss above except wherein the first signal path further includes a transmission line coupled to the transmitter and a first cable having a fixed propagation delay coupled to the first antenna.

However, Stolarczke et al. discloses the first signal path further includes a transmission line coupled to the transmitter and a first cable having a fixed propagation delay coupled to the first antenna (the transmitter 204 in figure 6b is tightly coupled to the transmission line conductor 32 by a pager repeater vertical tuned loop antenna 210

and an antenna cable 212 which link antenna 210 to transmitter, it is inherent that a antenna cable to have a fixed propagation delay, column 8, lines 18-22).

It is desirable to have the first signal path further includes a transmission line coupled to the transmitter and a first cable having a fixed propagation delay coupled to the first antenna because the repeater can communicate with the base station using medium frequency (column 4, lines 23-25). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Stolarczke et al. with the apparatus of Seocho-Ku and Behm to improve the functionality of the apparatus.

10. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seocho-Ku (EP 0 905 914 A2) in view of Behm (US 5,939,912) as applied to claim 21 above, and further in view of Young (US 6,643,522 B1).

Seocho-Ku in view of Behm disclose all the subject matter as discuss above except wherein the transmitter is a first transceiver that uses a first wireless protocol and the receiver is a second transceiver that uses a second wireless protocol.

However, Young discloses wherein the transmitter is a first transceiver that uses a first wireless protocol and the receiver is a second transceiver that uses a second wireless protocol (column 11, lines 11-20).

It is desirable wherein the transmitter is a first transceiver that uses a first wireless protocol and the receiver is a second transceiver that uses a second wireless protocol because it provides multiple services for users of different systems (column 3,

lines 1-2). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Young with the method of Seocho-Ku and Behm to improve the functionality of the system.

11. Claims 24, 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGeehan et al. (US 6,229,992 B1) in view of Behm (US 5,939,912) and Auckland et al. (US 2002/0183013 A1).

(1) Regarding claim 24:

McGeehan et al. discloses a system comprising:

a processor (digital signal processor 16 in figure 5, column 3, line 66 – column 4, line1);

a first signal path (the transmitting path from the transmitter 9 to the antenna 2 in figure 5), on which signals responsive to the processor are transmitted;

a first antenna (antenna 2 in figure 5, column 2, lines 5-7) coupled to the first signal path to transmit the signals from the first signal path;

a second signal path (the signal path from the antenna 1 to the receiver processor 15 in figure 5) on which signals to provide a communication to the processor is received;

a variable phase element (variable phase element 11 in figure 2) to place the correction signal in an anti-phase with an interference signal (variable phase 11 is control to achieve and maintain optimum cancellation of the unwanted transmitter output signal from the receive signal path, column 2, lies 51-55), the interference signal on an

interference path between the first signal path and the second signal path (the unwanted signal is from the transmit antenna path 2 to the receive antenna path 1 in figure 2), the interference path separate from a primary path of the correction signal (the primary path of the correction signal is through the variable phase element 11 and variable attenuator element 12 in figure 2); and

and a variable attenuator (variable attenuator 12 in figure 5, column 2, lines 51-52) couple to the variable phase element (variable phase element 11 in figure 5) to amplitude match the correction signal to the interference signal to provide substantial broadband cancellation of the interference signal (column 2, lines 51-65).

McGeehan et al. fails to explicitly discloses (i) a memory coupled to the processor; and (ii) an adjustable delay line to provide a time delay to a correction signal propagating from the first signal path to the second signal path, the adjustable delay line to place the correction signal in an anti-phase with an interference signal, the interference signal on an interference path between the first signal path and the second signal path, the interference path separate from a primary path of the correction signal.

With respect to (i), Auckland et al. discloses digital signal processor with memory couple to the processor (digital signal process (DSP) operate in conjunction with data and instructions stored in memory, the memory may be integrated with the DSP or may be packaged separately (paragraph 0090, lines 3-6).

It is desirable to have a memory coupled to the processor because it offers an integrated package for ease of manufacturing and resulting cost benefits (paragraph 0048, lines 6-7). Therefore, it would have been obvious to one of ordinary skill in the art

at the time of invention to employ the teaching of Auckland et al. in the apparatus of McGeehan et al. to reduce the production cost.

With respect to (ii), McGeehan et al. discloses that alternatively, delay element may be inserted in some or all of the signal paths to permit cancellation of elements of the unwanted transmitter output signal which have arrived at the receive antenna by a long path (column 3, lines 52-56).

With respect to (ii), Behm discloses an adjustable delay line (variable delay line 142 in figure 2) to provide a time delay to a correction signal propagating from the first signal path to the second signal path the adjustable delay line to place the correction signal in an anti-phase with an interference signal, the interference signal on an interference path between the first signal path and the second signal path, the interference path separate from a primary path of the correction signal (delay line 142 is controlled by the feedback signal and is set to provide a delay such that the output signal from the delay line is 180 degrees out of phase with the input signal, column 7, lines 59-64).

It is desirable to have a variable delay line to apply a time delay placing the signal in an anti-phase with the interference signal because it allow for infinite phase adjustability (column 2, lines 21-23). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the variable phase element 11 of McGeehan et al. with the variable delay line of Rehm to increase the flexibility of the system.

(2) Regarding claim 26:

McGeehan et al. further including a controller to manage the variable attenuator and the adjustable delay line (the digital signal processor 16 in figure 5, column 3, line 66-column 4, line 3).

(3) Regarding claim 27:

McGeehan et al. fails to disclose a first tap to couple the correction signal to a primary path from the first signal path to the adjustable delay, and a second tap to couple the primary path to the second signal path, wherein the first tap and the second tap each provide about a 90 degree phase shift to the correction signal.

However, McGeehan et al. discloses a subtractor 13 in figure 5 to subtracting the interference correction signal from the receiving path, practically, it is function equivalent to apply a total of 180 degree phase shift to the correction signal for canceling out the interference signal in the receiving path.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify McGeehan et al. reference to include the claimed "a 90 degree phase shift upon sampling and providing about a 90 degree phase shift coupling the sampled signal to a signal path receiving the interference signal" feature in McGeehan et al.'s teaching, in order to obtain an inverted interference signal for canceling out the signal path receiving the interference signal.

(4) Regarding claim 28:

McGeehan et al. discloses wherein the system further includes a data transmitting module coupled to the first signal path collocated with a data receiving module coupled to the second signal path (the system in figure 5 is a transceiver,

therefore there is a transmitting module (9) couple to the first signal path collocated with a data receiving module (15) coupled to the second signal path, column 1, lines 29-45).

(5) Regarding claim 29 and 30:

McGeehan et al. discloses wherein the system is a computer or a laptop (the system discloses in figure 5 contains a digital signal processing to process the data for a transceiver, therefore, the system in figure 5 can be consider as a computer or a laptop computer).

12. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over McGeehan et al. (US 6,229,992 B1) in view of Behm (US 5,939,912) and Auckland et al. (US 2002/0183013 A1) as applied to claim 24 above, and further in view of Sugar et al. (US 2002/0080728 A1).

McGeehan et al. in view of Behm and Auckland disclose all the subject matter as discuss above except wherein the first signal path includes a transmitter to transmit a first signal using a first protocol and the second path includes a receiver and a second antenna to receive a second signal using a second protocol.

However, Sugar et al. discloses wherein the first signal path includes a transmitter to transmit a first signal using a first protocol and the second path includes a receiver and a second antenna to receive a second signal using a second protocol (figure 2 is a block diagram of the wideband transceiver system architecture that has a transmitting antenna and a receiving antenna attached to a transmitter and a receiver respectively, and the wideband architecture is used to process multiple WLAN protocols

such as Bluetooth, Home RF and IEEE 802.11 in the 2.4 GHz ISM band, paragraph 0018, lines 1-7).

It is desirable to have the first signal path includes a transmitter to transmit a first signal using a first protocol and the second path includes a receiver and a second antenna to receive a second signal using a second protocol because it benefit from IC cost reduction associated with reductions in digital CMOS IC geometry (paragraph 0007). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Sugar et al. with the apparatus of McGeehan et al., Behm and Auckland to make the method more cost efficient.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Siu M. Lee whose telephone number is (571) 270-1083. The examiner can normally be reached on Mon-Fri, 7:30-4:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Siu M Lee
Examiner
Art Unit 2611
7/19/2007

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER